REMARKS

Claims 1-20 are pending in this application, with claim 10 amended. The amendment to claim 10 merely corrects a readily apparent clerical error, and does not change its scope or necessitate a new search.

Claim 10 was objected to because of informalities noted in the Office Action. These informalities have been corrected, and the objection should therefore be withdrawn.

Claims 13-15 were objected to as being dependent on a rejected base claim. The indication of allowable subject matter in these claims is acknowledged and appreciated.

All Rejections Under 35 U.S.C. § 103(a) Are Traversed

Claims 1-5, 8-11 and 16-20 were rejected under 35 U.S.C. § 103(a) as unpatentable over Geng and Mihara; claims 6-7 were rejected under 35 U.S.C. § 103(a) as unpatentable over Geng, Mihara and Gatti; and claim 12 was rejected under 35 U.S.C. § 103(a) as unpatentable over Geng, Mihara and Wober. All of these rejections are respectfully traversed.

The references Geng and Mihara fail to disclose or suggest all elements of the independent claims 1 and 16. These references therefore do not support an assertion of unpatentability under 35 U.S.C. § 103(a). In addition, one of ordinary skill would not have been motivated to combine the references in the proposed manner. The remaining claims are also allowable, at least as depending from allowable base claims. The deficiencies of Geng and Mihara are explained more fully below.

Geng And Mihara Fail To Disclose All Elements of Independent Claims 1 & 16

A. Generating the Light Matrix

Geng discloses a facial recognition system in which multiple two-dimensional images of a face are generated from a three-dimensional model of the face. Abstract; ¶ 0043. The two-dimensional images are maintained in a database and used to identify

input images. Id. Geng fails to disclose or suggest "generating a two-dimensional light intensity matrix, each matrix entry mapped to a unique surface element of the surface geometry, each matrix entry representing a modeled light intensity correlated to a mapped unique surface element of the digital object," as defined by claim 1. Similarly, Geng fails to disclose or suggest "a memory holding a two-dimensional light intensity matrix, each matrix entry mapped to a unique surface element of the digital object and representing a modeled light intensity correlated to a mapped unique surface element of the digital object," as defined by claim 16.

The Office Action cites Fig. 17 of Geng as disclosing these elements, but this is incorrect. Fig. 17 of Geng shows that a camera takes a 2-D image that can be projected onto a 3-D model. In Geng's own words, Fig. 17 illustrates "two-dimensional to three-dimensional' Fitting Techniques-fit the generic face model to subject-specific two-dimensional image to obtain three-dimensional face model." ¶ 0099. In the subsequent description, Geng merely describes using two photographic images of a subject to determine the depth of a feature point. ¶ 0103-104. However, a two-dimensional image as taken by a camera is not a "light intensity matrix" as defined by the present application and used in claims 1 and 16.

The present specification defines a "light intensity matrix" as a light map made up of "lumels." Page 9:17-10:13. A light intensity matrix or light map may be distinguished from a mere image in several respects. For example, "[u]nlike a color map, a light map contains a map (or matrix) of light intensity (brightness or luminosity) values representing diffuse reflection from a standard (e.g., Lambertian gray) surface of the modeled object." Page 9:23-26. A photographic image as disclosed by Geng is not a light intensity matrix because it does not map brightness or luminosity values from a standard surface of a modeled object. Indeed, the images shown in Fig. 17 of Geng are taken of a real object, not of a modeled object. Nor is any use made of a standard surface. Geng nowhere else discloses any use of a light intensity matrix as defined by the present application. Hence, Geng fails to disclose or to suggest these elements of

claims 1 and 16.

B. Blurring The Light Matrix

Geng further fails to disclose or suggest blurring a light intensity matrix as defined by claims 1 and 16. This deficiency is acknowledged in the Office Action. As noted above, Geng fails to disclose any use of a light intensity matrix, not to mention blurring of such a matrix.

Mihara fails to make up for these deficiencies of Geng. Mihara discloses use of Marr-Hildreth operators for edge detection in a captured image. Col. 5:1-21. A captured image (e.g., a photograph) is distinct from a light intensity matrix as defined by claims 1 and 16, because a captured image lacks brightness or luminosity values representing diffuse reflection from a standard (e.g., Lambertian gray) surface of a modeled object. Mihara therefore fails to disclose any blurring or other operation performed on a light intensity matrix.

Mihara also fails to disclose or suggest "blurring the light intensity matrix, thereby producing a blurred matrix," as defined by claim 1. Mihara likewise fails to disclose or suggest that "the light intensity matrix is a blurred matrix," as defined by claim 16. Mihara instead discloses use of the Laplacian of the Gaussian operator to detect zero crossings for use in edge detection. The Laplacian is a second derivative operator; it is not actually a blur operator at all. While the Gaussian is a blur operator, Mihara fails to disclose use of the Gaussian alone. Therefore, Mihara fails to disclose any blurred matrix, because application of the Laplacian would not result in a blurred matrix.

C. Rendering Using The Blurred Light Intensity Matrix

The Office Action apparently has overlooked this element of the claims, as it is not discussed in the Office Action. Both Geng and Mihara fail to disclose or suggest "rendering the digital object, using matrix entries from the blurred matrix to determine pixel intensity values for the digital object," as defined by claim 1. Likewise, these references fail to disclose determining "pixel intensity values for rendering the digital object using matrix entries from the blurred matrix," as defined by claim 16. Both Geng

and Mihara are concerned with facial recognition, not with rendering finished images of modeled objects. Nor do these references teach any use of a blurred light intensity matrix in rendering such images.

One Of Ordinary Skill Would Have Had No Motivation to Combine

The Office Action fails to identify any reasonable basis for a combination of Geng and Mihara. The provided reason, that "[o]ne of skill in the art would include a blurring image step because to eliminate noises in the images, which will be use [sic] to generate a three dimensional image of the object, improving the image quality," is plainly deficient. Such a reason would not have existed, because blurring generally does not improve image quality. A blurry image is not of higher quality than a clear image, nor does blurring reduce noise. Blurring can be used to smooth an image to make edge detection more uniform, but the present claims have nothing to do with edge detection. In addition, claims 1 and 16 define blurring a light intensity matrix, not an image. The cited reason therefore does not address what is defined by the claims.

Conclusion

In view of the foregoing, the Applicants respectfully submit that Claims 1-20 are in condition for allowance. Reconsideration and withdrawal of the rejections is respectfully requested, and a timely Notice of Allowability is solicited.

To the extent it would be helpful to placing this application in condition for allowance, the Applicants encourage the Examiner to contact the undersigned counsel and conduct a telephonic interview.

While no fees are believed due in connection with the filing of this paper, the Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-3683.

Respectfully submitted,

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